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Original Article

Effect of interesting games on relief of preoperative anxiety in preschool children

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ABSTRACT

Purpose: To evaluate the effect of interesting games on reducing preoperative anxiety and improving compliance with anaesthesia in children.

Methods: Ninety preschool-aged children undergoing elective surgery were randomly assigned to two groups. The children in the control group were admitted to a general preoperative room with one parent for 15–20 min, and were then taken into the anaesthesia room. During anaesthetic induction, the nurse attracted the children's attention using an interesting game with encouragement and attention diversion. The children's anxiety was assessed using the Modified Yale Preoperative Anxiety Scale (mYPAS) when they entered the operating room, while they were waiting to undergo s0urgery, and during anaesthetic induction. Moreover, the children's compliance with anaesthetic induction was assessed using the Induction Compliance Checklist (ICC).

Results: No statistically significant differences in the mYPAS scores were observed between the two groups upon entering the operating room ($p > 0.05$). The mYPAS scores were significantly lower in the experimental group than in the control group while waiting for surgery and during anaesthetic induction ($p < 0.05$), while there were no significant differences in the mYPAS scores upon entering the operating room. The children's compliance with anaesthetic induction was significantly higher in the experimental group than in the control group ($p < 0.05$).

Conclusion: Engagement in an interesting game can reduce preschool-aged children's preoperative anxiety and improve their compliance with anaesthetic induction.

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1. Introduction

Due to psychological immaturity, children usually feel scared and nervous in the operating room, which is a strange environment to them. In addition, more than 60% of children feel anxious [1] while undergoing anaesthetic induction. These unhealthy emotions may have serious negative impacts such as timidity, nocturnal enuresis, anxiety, depression, action displacement, and other sequelae in later life; in some cases, these negative impacts may last for years [2]. According to some research reports [3], children inherently feel interested in games, which can reduce operation-associated pain and improve compliance during venipuncture. The present study focused on preoperative intervention in the form of interesting games in preschool-aged children to relieve their negative emotions and allow for smoother anaesthetic induction.

2. Materials and methods

2.1. Patients

Preschool children who had undergone operations in the Paediatric Surgery Department of our hospital from September 2011 to January 2012 were selected for inclusion in the present study. Ill children who met the following inclusion criteria were enrolled: age of 3–6 years; had undergone his or her first operation or had undergone an elective operation; no mental disorders, developmental retardation, or hypophrenia; presence of routine surgical disease, but no heart disease, bone fracture, or serious disease; operations requiring general anaesthesia; and parents agreed to participate in the research. In total, 59 children met these inclusion criteria. All children were divided into an experimental group and control group using a random number table.

The experimental group comprised 29 children, including 20 male and 9 female children with an average age of 4.52 ± 1.21 years. Of these 29 children, 10 underwent oblique inguinal hernia repair, 8 underwent superficial tumour excision, 7 underwent cryptorchidopexy, and 4 underwent hypospadias repair. The control group comprised 30 children, including 23 male and 7 female children with an average age of 4.37 ± 1.09 years. Of these 30 children, 13 underwent oblique inguinal hernia repair, 6 underwent superficial tumour excision, 5 underwent cryptorchidopexy, and 6 underwent hypospadias repair. All 59 children underwent intravenous anaesthetic induction. No statistically significant differences were noted in age, sex, or operation mode between the experimental and control groups (age: $t = 0.50$, $p = 0.62$; sex: $x^2 = 0.44$, $p = 0.51$; operation mode constituent ratio: $x^2 = 1.39$, $p = 0.71$).

2.2. Research methods

2.2.1. Experimental group

The anaesthesia induction room was decorated with items of interest to children. Cartoons were pasted onto all walls; the floor was covered by splicing foam floorboards of different colours; many kinds of toys were provided, including cartoon car models, puppets, and drawing boards; and a mini DVD player and various cartoon discs were provided. A bookshelf was placed in one corner of the room and contained books full of illustrations appropriate for preschool children, such as *Grimm's Fairy Tales*, *A Hundred Thousand Whys*, and others.

Within 15–20 min before the operation, the children in the experimental group entered the decorated anaesthesia induction room with their parents. One nurse from the operating room accompanied them. The children selected a game according to their own interest, and the nurse joined them to increase the sense of trust. For instance, if the child elected to watch an animated cartoon, the nurse asked questions such as, "Who do you like in the cartoon and why do you like it?" and provided explanations such as, "I shall give an injection in your hand after a while, just like the mosquito bites you, and you will not feel pain." The goal was to provide psychological preparation for the surgery. The nurse then began the venipuncture procedure while another nurse attracted the child's attention using various methods of encouragement, such as implied wording, encouraging wording, or reward methods such as, "You are so good, The Pleasant Sheep does not cry when it is given the injection, you are so brave like the sheep," "You are so brave, your teachers and friends in the nursery school like you," and so on. The nurse also offered the child a cartoon smile poster as a reward. After finishing the venipuncture procedure, a pulse oximeter was pasted up with the cartoon pictures, or pictures were used to observe the child's oxygen saturation and heart rate. The anaesthetist injected the anaesthetic in the anaesthesia induction room in accordance with the child's weight and age. After induction of anaesthesia, a transfer trolley was used to move the child to the operating room. The child's parents then left the anaesthesia induction room.

2.2.2. Control group

The children in the control group underwent routine care and preparation for 15–20 min before the operation. One parent accompanied the child into the waiting room before the operation. The nurse said a few words to comfort the child and answered any questions raised by the child and his or her parent to address their concerns about the anaesthesia and the operation. The operating room nurse brought the child into the general anaesthesia induction room to perform the venipuncture procedure and anaesthetic induction. The child was then moved to the operating room.

2.3. Assessment method

The Modified Yale Preoperative Anxiety Scale (mYPAS) was used to assess the children as they entered the operating room, waited to undergo the operation, and underwent anaesthetic induction. The mYPAS is used to describe the mental anxiety of children aged 2–12 years during the perioperative period. It contains 5 sections and 22 items. The five sections are mental status, language, emotion expression, wakefulness, and dependency on parents; every item has a

Table 1 – Modified Yale Preoperative Anxiety Scale scores of children in the two groups at different time points.

Group	*n*	Entering the operating room	Waiting to undergo the operation	Undergoing anaesthetic induction
Intervention	29	30.81 ± 3.64	27.87 ± 3.36	51.32 ± 11.34
Control	30	30.43 ± 3.27	34.11 ± 4.83	58.89 ± 13.39
t		0.415	−5.741	−2.338
p		0.680	0.000	0.023

Scores are presented as mean ± standard deviation.

different score, and the total score is 21–100. The higher the score, the more severe the child's anxiety. The mYPAS shows good confidence ($k = 0.63–0.90$) and criterion validity for repeated evaluations performed by the same evaluator or different evaluators; the mYPAS also shows good effectiveness ($r = 0.79$) [4].

The Induction Compliance Checklist (ICC) was used to assess the behavioural expression of the children during the anaesthetic induction period. It contains 11 items and has a total score of 0–10. A score of 0 indicates that the anaesthetic induction was very smoothly performed and that there was no uncooperative behaviour. A score of 10 indicates induction failure; specifically, the child was uncooperative during anaesthetic induction. The lower the score, the higher the level of cooperation. The ICC also shows good effectiveness between two evaluators ($r = 0.978$) [5].

The game chosen by each child in the experimental group was recorded. The same researcher scored the ICC to avoid subjective differences.

3. Results

In the experimental group, 21 children (72.4%) selected the cartoon DVD, 19 (65.5%) selected the toy cars, 5 (17.2%) selected books, 5 (17.2%) selected puppets, and 4 (13.8%) selected drawings.

The comparison of the mYPAS scores between the two groups of children at different time points in the study is shown in Table 1.

The ICC scores of the children in the two groups while undergoing anaesthetic induction were also compared. The score of the children in the experimental group was 1.66 ± 1.76, where the mean rank was 24.62; these children were not scared or anxious and cooperated during anaesthetic induction. The score of the children in the control group was 2.77 ± 1.31, where the mean rank was 35.20; these children cried, felt scared, and only cooperated during anaesthetic induction with effort. The Mann–Whitney non-parametric test revealed a statistically significant difference in the ICC scores of the two groups ($Z = -2.402$, $p = 0.016$).

4. Discussion

4.1. *Interesting games can relieve preoperative anxiety and fear in preschool children*

"Interest" is an attractor. Being interested in something means that a person is devoted to it and is absorbed in the object [6]. Games are very interesting to children. Because of their young age and cognitive development level, children do not understand the purpose or significance of a surgical operation and are prone to regard it as a threat [7]. This fear can increase the secretion of cortisol and norepinephrine, which in turn affect the surgical outcome, reduce the child's tolerance of the operation, and increase the incidence of post-anaesthetic and postoperative complications [8]. An anaesthesia induction room full of items that a child finds interesting reportedly reduces negative environmental stimulation, and an abundance of toys meets the child's psychological needs. Allowing children to select the activity in which they are interested not only shows respect for their selection, but also enhances their interest in the game. The Table shows that the mYPAS scores of the children in the experimental group were significantly lower than those of the children in the control group while waiting to undergo the operation. This shows that interesting games relieve the anxiety of children while waiting to undergo operations. Hosseinpour and Memarzadeh [9] found that children may easily forget the upcoming operation and experience substantially less fear while playing with something. When playing with toys, smiling can change the level of chemical substances within the nervous system, improve immunity, and reduce muscular tension [10].

4.2. *Interesting games improve cooperation during anaesthetic induction*

Many studies worldwide [3,11,12] have shown that games can improve children's compliance during intravenous fluid infusion and medical examination and are beneficial for ill children taking preoperative medications. The degree of cooperation during anaesthetic induction is an important factor that contributes to whether the induction will be successfully performed and that is directly related to the performance of the operation. The venipuncture procedure affects the degree of cooperation by the child during anaesthetic induction; ill children may refuse to undergo venipuncture because of fear and pain. In the present study, the anaesthesia induction room was full of items interesting to the children, games were used for divert the children's attention, and encouraging words were used to increase the children's self-confidence. As a result, the degree of cooperation with anaesthetic induction was higher in the experimental group than in the control group. Some researchers have found that pain is an experience common to both body and mind [13]. Positive emotions such as joy, excitation, or confidence can reduce sensitivity to noxious stimulation and improve the pain threshold; in contrast, negative emotions such as fear, sadness, or disappointment can reduce the pain threshold [14]

4.3. *Precautions for intervention*

During the anaesthetic induction period, the parent should be encouraged to engage in the game with their child. The anaesthesia and operation processes should be introduced to the parent to prevent the parent's negative emotions from impacting the child [15]. When conducting the venipuncture procedure, some children may become uncooperative; providing encouragement to the children and ensuring that the parents do not blame the children can be helpful. In addition, because many anaesthetic agents take effect very quickly, medical workers should guarantee the safety of the children and inform the parents of the children's anaesthetic status and performance in advance to avoid fear.

In conclusion, preoperative prevention measures for children are undergoing continuous research. A frequently studied measure is the situational game during the preoperative visit; in some games, the doctor may even become a clown for the children. Some intervention methods consume time and labour and are not appropriate for the national conditions of China. Intervention methods worthy of further research are simple and convenient and can be applied in the operation room; this not only allows children to remain in a relaxed atmosphere, but also helps to guarantee the safety of the children. The means of performing such research in preschool children is limited in many areas. Increasing the means to perform such research will lead to improvements in the preoperative care of children undergoing surgery.

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